UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
(ONLINE)
SEMESTER II
SESSION 2020/2021

COURSE NAME	:	CORROSION & PREVENTION
COURSE CODE	:	MDB 10303
PROGRAMME	:	MDM
EXAMINATION DATE	:	JULY 2021
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS
		OPEN BOOK EXAMINATION

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) An electrode has a potential of -0.80 V relative to a silver-silver chloride electrode with concentration [a_{Cl^-}] 9 X 10^{-3}. What is the electrode potential on the hydrogen scale?

(10 marks)

(b) Why localized corrosion is initiated by the rupture of a protective film on steels, and how it assits to stress corrosion cracking?

(15 marks)

Q2 (a) A watch was having corrosion as shown in **Figure Q2 (a)** after 10 years of wearing. Identify forms of corrosion and how the corrosion mechanism happened. Give your suggestion to solve this problem.

(10 marks)

(b) Explain the formation of 'patina' as self-defense for copper.

(15 marks)

Q3 (a) Give your idea of how to minimize stray current in Kuala Lumpur city from interrupting cathodic protection assembly.

(15 marks)

(b) Why are inhibitors bonded by chemisorption more effective than inhibitors bonded by physical adsorption?

(10 marks)

Q4 (a) What are the advantages of using chromium coatings over tin coatings in food cans?

(10 marks)

(b) It is very difficult to avoid crevices in design. Suggest the techniques which can be used to control crevice corrosion in design.

(15 marks)

-END OF QUESTIONS-

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Table Q1 : emf Series of standard electrode potential at 25 C

Half-Cell Reaction	E^o (volts)
$F_2 + 2e \longrightarrow 2F^-$	2.87
$Au^+ + e \longrightarrow Au^+$	1.68
$Cl_2 + 2e \longrightarrow 2Cl^-$	1.36
$O_2 + 4H^+ + 4e \longrightarrow 2H_2O$	1.229
$O_2 + 4H^+ (10^{-7}\ M) + 4e \longrightarrow 2H_2O$	0.82
$Ag^+ + e \longrightarrow Ag$	0.799
$Fe^{3+} + e \longrightarrow Fe^{2+}$	0.771
$O_2 + 2H_2O + 4e \longrightarrow 4OH^-$	0.48
$Cu^{2+} + 2e \longrightarrow Cu$	0.337
$AgCl(s) + e^- \rightarrow Ag(s) + Cl^-(aq)$	0.22
$2H^+ + 2e \longrightarrow H_2$	0.0000
$Pb^{2+} + 2e \longrightarrow Pb$	-0.126
$Sn^{2+} + 2e \longrightarrow Sn$	-0.14
$Ni^{2+} + 2e \longrightarrow Ni$	-0.25
$Co^{2+} + 2e \longrightarrow Co$	-0.28
$Fe^{2+} + 2e \longrightarrow Fe$	-0.44
$Cr^{3+}(aq) + 3e^- \rightarrow Cr(s)$	-0.74
$Zn^{2+} + 2e \longrightarrow Zn$	-0.763
$Al^{3+} + 3e \longrightarrow Al$	-1.66
$Mg^{2+} + 2e \longrightarrow Mg$	-2.34
$Na^+ + e \longrightarrow Na$	-2.714
$Ca^{2+} + 2e \longrightarrow Ca$	-2.87
$K^+ + e \longrightarrow K$	-2.925

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Figure Q2(a): Localized corrosion on a watch